

# PATENT SPECIFICATION

(11) 1 403 828

1 403 828

- (21) Application No. 54326/73 (22) Filed 22 Nov. 1973  
 (31) Convention Application No. 2 257 176  
 (32) Filed 22 Nov. 1972 in  
 (33) Germany (DT)  
 (44) Complete Specification published 20 Aug. 1975  
 (51) INT CL<sup>2</sup> F16D 65/12, 65/84  
 (52) Index at acceptance F2E 1E 2N2B1B2 2N2B4



## (54) AN IMPROVED BRAKE DISC ASSEMBLY

(71) We, DR. ING. H.C.F. PORSCHE AKTIENGESELLSCHAFT, of Porsche-strasse 42, Stuttgart-Zuffenhausen, Germany, a German Company, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The invention relates to a brake disc assembly for motor vehicles comprising two spaced discs positioned parallel to each other and interconnected by ribs, with a plurality of recesses on the braking surface of each disc.

Brake discs of the above-mentioned kind are known in which the recesses extend parallel to each other and are arranged without structural connection to the ribs interconnecting the discs. This is liable to lead to the formation of cracks in the region of the recesses when the brake disc assembly is subjected to high stresses, for instance, in high power vehicles, which can cause complete destruction of the brake disc assembly.

The object of the present invention is to provide a brake disc assembly which overcomes the above-mentioned disadvantage by suitable arrangement of the recesses and of the ribs.

The present invention consists in a brake disc assembly comprising two spaced discs which are parallel to each other and interconnected by ribs, and a plurality of openings in the braking surface of each disc, which openings are positioned adjacent the ribs. Preferably, the openings extend through the discs into grooves formed in the ribs. The ribs may be shaped so that they partly surround the openings. The openings may be arranged on either side of the ribs.

The ribs and the openings may be positioned along radially extending dividing lines, or along dividing lines extending in impeller-like formation.

The openings are preferably of frusto-

conical shape, with the smaller diameter of the openings positioned adjacent the braking surface side of each disc.

The openings cast-in during the manufacture of the discs are subsequently machined and during this process the openings are bored.

The advantages mainly achieved by the present invention are to be seen in that the openings and the ribs are arranged relatively to each other such that the brake disc assembly is able to withstand high stresses. For various types of stress it is advantageous if the ribs and openings are positioned on similarly extending dividing lines. The arrangement is still more satisfactory if the openings are frusto-conical in shape and are subjected to suitable machining operations during manufacture.

In the accompanying drawings:—

Figure 1 is a part elevation, partly in section of a brake disc according to the present invention,

Figure 2 is a cross-section taken on the line II—II of Figure 1,

Figure 3 is a view similar to Figure 1 of another embodiment of the invention, and

Figure 4 is also a view similar to Figure 1 of a further embodiment of the invention.

The brake disc assembly 1, manufactured of cast iron, comprises two discs 2, 3 spaced parallel from each other and connected together by a series of radially extending ribs 4. With this construction chambers 5 are formed between adjacent ribs 4 by means of which a highly effective interior ventilation and resultant cooling of the brake disc assembly 1 can be obtained. The disc 2 is connected to a pot-shaped hub portion 6 provided with fastening openings 7 and cut-out apertures 8. The ribs 4 extend along uniformly spaced dividing lines which extend outwards as radii 9 from the centre "M" of the brake disc assembly 1.

For improving the cooling, the weight and the braking action of the brake disc, openings are provided in friction surfaces

50

55

60

65

70

75

80

85

90

10, 11 of the disc 2, 3. These openings 12 extend through the discs in the vicinity of the ribs 4, preferably directly alongside the ribs. The openings 12 which are provided on both sides of the ribs 4 extend axially through the disc 2, 3 and continue as recesses 13 in the ribs.

The openings 12 are frusto-conical, the small diameter "d" of the cone being adjacent the friction surface sides 10, 11 of the discs 2, 3. Moreover these openings, insofar as they are provided when the casting takes place, may be subsequently machined by suitable methods, for instance, boring.

In the embodiment shown in Figure 3 the ribs 15 are formed with grooves 16 so that without subsequent machining, they partially surround openings 17. In this arrangement the ribs 15 may also however be arranged with constant thickness round the openings 17 with a sinuous configuration.

According to Figure 4 the ribs 18 and openings 19 extend along uniformly spaced, arcuate dividing lines 20 which are arranged in impeller-like formation on the discs 2, 3 of the brake disc 1.

#### WHAT WE CLAIM IS:—

1. A brake disc assembly comprising two spaced discs which are parallel to each other and interconnected by ribs, and a plurality of openings in the braking surface of each disc, which openings are positioned adjacent the ribs.

2. A brake disc assembly according to claim 1, wherein the openings extend alongside the ribs.

3. A brake disc assembly according to claim 2, wherein the openings extend through the discs into grooves formed in the ribs.

4. A brake disc assembly according to claim 2, wherein the ribs are shaped to partly surround the openings.

5. A brake disc assembly according to any of claims 2 to 4, wherein the openings are arranged on either side of the ribs.

6. A brake disc assembly according to any of claims 2 to 5, wherein the ribs and the openings are positioned along radially extending dividing lines.

7. A brake disc assembly according to any of claims 2 to 5, wherein the ribs and the openings are positioned along dividing lines extending in impeller-like formation.

8. A brake disc assembly according to any of the preceding claims, wherein the openings are of frusto-conical shape.

9. A brake disc assembly according to claim 8, wherein the small diameter of the openings are adjacent the braking surface side of each disc.

10. A method for producing a brake disc assembly according to any of the preceding claims, wherein the assembly is manufactured by a casting process and the openings cast-in during the casting of the assembly are subsequently machined.

11. A method according to claim 10, wherein the openings are bored out.

12. A brake disc assembly substantially as described with reference to Figures 1 and 2, or Figure 3, or Figure 4 of the accompanying drawings.

MARKS & CLERK,  
Chartered Patent Agents,  
57 & 58 Lincoln's Inn Fields,  
London, WC2A 3LS.  
Agents for the Applicants.



Fig.3

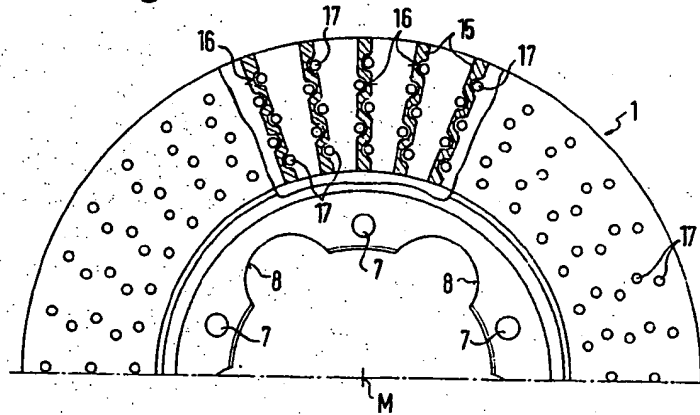


Fig.4

